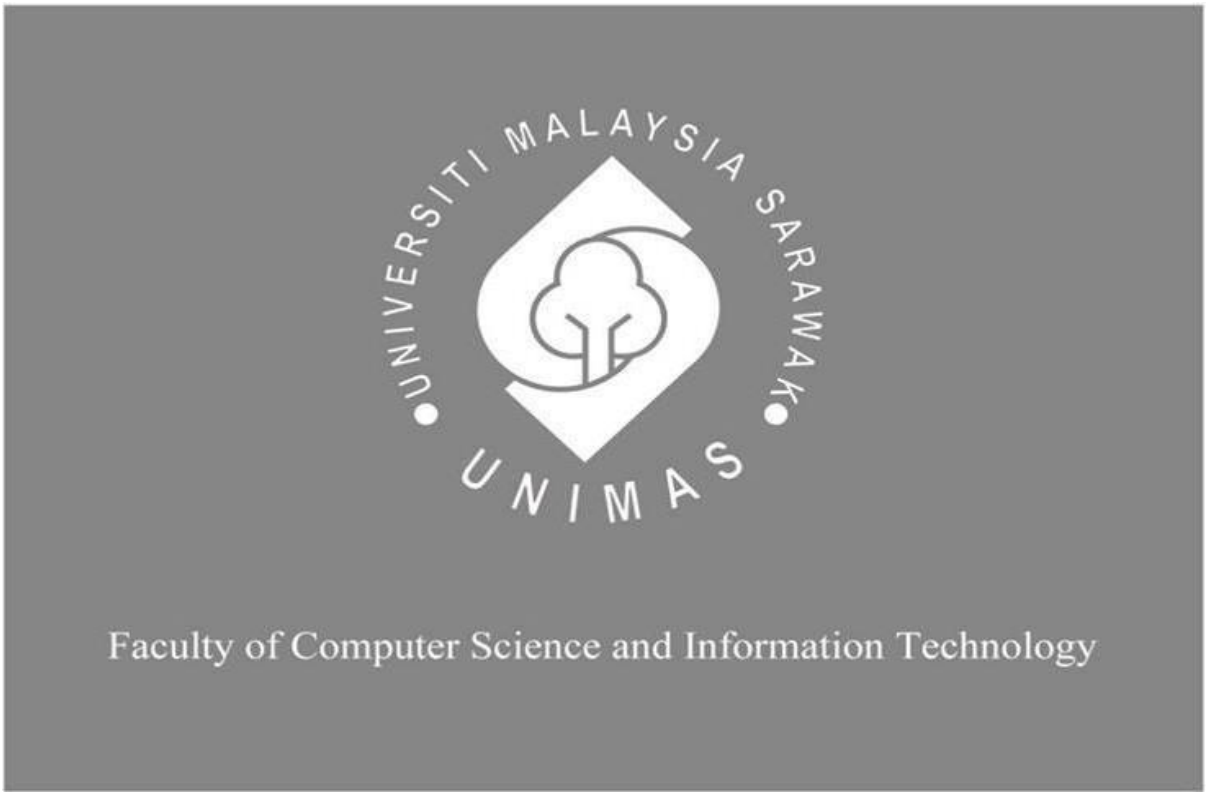

Visitor Timeline Tracking Using Face and Car Plate Recognition

Teng Chin Hui

Bachelor of Computer Science and Information Technology with Honours

(Computational Science)

2020

UNIVERSITI MALAYSIA SARAWAK

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TENG CHIN HUI

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VISITOR TIMELINE TRACKING USING FACE AND CAR PLATE RECOGNITION

TENG CHIN HUI

This project is submitted in partial fulfilment of the
requirements for the degree of
Bachelor of Computer Science with Honours
(Computational Science)

Faculty of Computational Science and Information Technology
UNIVERSITI MALAYSIA SARAWAK
2020

PENGESANAN GARIS MASA PELAWAT MENGGUNAKAN PENGENALAN MUKA DAN PLAT KERETA

TENG CHIN HUI

Projek ini merupakan salah satu keperluan untuk Ijazah Sarjana Muda
Sains Komputer dan Teknologi Maklumat
(Sains Komputan)

Fakulti Sains Komputer dan Teknologi Maklumat
UNIVERSITI MALAYSIA SARAWAK
2020

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I hereby declare that this research together with all of its content is none other than that of my own work, with consideration of the exception of research-based information and relative materials that were adapted and extracted from other resources, which have evidently been quoted or stated respectively.

Signed,

……

Teng Chin Hui 12 December 2019

Faculty of Computer Science and Information Technology

Universiti Malaysia Sarawak.

Acknowledgment

I wish I have a chance to thank my supervisor, Dr. Lau Sei Ping gratefully for the guidance and support throughout the project. This is because, without him, my final year project would not be completed successfully. And then, I also need to thank my examiner, Dr. Johari Abdullah who giving constructive comments and suggestions about my final year project.

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Abstract

Nowadays, the security of the campus is an urgent issue for the safety of students, lecturersand staff. They need to enter the campus for their purposes every day. There are many visitors also allowed to enter the campus for their purposes. The traditional visitor tracking system is no longer well efficient for campus security tasks currently. To provide more security measures, the Visitor Timeline Tracking Using Face and Car Plate Recognition are proposed. The main function of the proposed system is to identify and track the people by using the face and car plate recognition as mentioned in the name of the system. The entering time and leaving time of each person will be recorded in the system. In the future, this system could be applied to each of the schools and campuses to decrease the load of the workflow of the security and enhance the safety of schools and campuses.

Abstrak

Kini, keselamatan kampus adalah isu rumit kepada keselamatan pelajar, pensyarah dan kakitangan kampus. Mereka perlu memasuki kampus unutk tujuan mereka pada setiap hari. Terdapat banyak pelawat juga dibenarkan memasuki kampus untuk tujuan mereka juga. Sistem penjejakan pelawat tradisional kurang cekap untuk bertugas jaga keselamatan kampus pada masa sekarang. Untuk memberikan langkah yang lebih selamat, sistem pengesanan garis masa pelawat menggunakan pengenalan muka dan plat kereta dicandangkan. Fungsi utama sistem yang dicadangkan adalah identiti dan mengesan orang dengan menggunakan pengenalan muka dan plat kereta seperti disebutkan dalam nama sistem. Masa masuk dan masa keluar setiap orang akan direkodkan dalam sistem. Pada masa akan datang, sistem ini dapat digunakan di setiap sekolah dan kampus untuk mengurangkan beban alir kerja keselamatan dan meningkatkan keselamatan sekolah dan kasmpus.

CHAPTER 1: INTRODUCTION

1.1 Introduction

UNIMAS is one of the public universities in Malaysia. There are almost 16,000 students and 2300 staff who including the lecturers at the UNIMAS. Most of the staff and students stay at the outside and they need to enter the campus by using three entrances, which are the main entrance, Unijaya entrance and east campus entrance. There are also many visitors also visit the campus by entering the main entrance. These entrances have been guarded by the security guards who under the Safety Unit of UNIMAS to provide the secure and track the people.

As the campus encourages social interaction by allowing the visitors to enter and visit our campus, there is a hidden danger to the safety of the campus. The existing system for visitor tracking on campus is unsuited to provide the secure currently. Besides, the task of the guards is to use the manual-based workflow to secure the area of UNIMAS. Although there is a centralized system based on the campus, the ratio of the workflow is dependent on manual operations. The speed of operation is far less than the speed of visitors entering the campus. Although the current system will be efficient in normal time, it can no longer provide the security for the campus at the peak time. This will bring a hidden crisis to campus security. Therefore, there is an innovative system that will introduce to solve the current problem.

The visitor timeline tracking via face and car plate recognition system will able to assist the security workflow. It is combined with two technologies which are a more suitable way to solve this kind of security matter. Moreover, it will make the security work more efficiently and can detect most of the people and cars by using a camera. At the peak session, the system

will track every outside car entering and leaving the campus to ensure each car will not stay on the campus.

1.2 Problem Statement

Many cars and people are entering and leaving the campus for many purposes. However, these should be considered a security problem to the security guards who need to check and ask the drivers are students or visitors. This is because most of the students haven't got their car or hard to get the official vehicle pass from Safety Unit. Besides, this is also not to mention the visitors.

There is another problem with the burden of the security guards. They have their security workflow which is efficient but can further upgrade to make it simpler and automated. For example, many people do not have any official vehicle pass and they would get the temporary vehicle pass from the security guards. As an exchange, the visitors need to submit their IC or driving license to get the temporary pass and entering the campus. This is inconvenient for the security guards to do the manual operation of sending their documents to the Safety Unit if visitors haven't left within the time. And the visitor will get the warnings or penalty by their action.

Moreover, if some people use the illegal use of official vehicles pass entering the UNIMAS, the security guards cannot differentiate the pass is legal or illegal. And there will cause that the security of UNIMAS will fall into an insecure situation.

1.3 Scope

The scopes of this project are outlined as:

- To operate the face recognition to the front seats of the vehicle.
- To detect and recognize the character of the actual and legal official car plate.

- To build a timeline and record the cars and drivers entering and leaving the campus.

1.4 Aim and Objectives

The main objectives of the Visitor timeline tracking with Face and Car Plate Recognition System are to design and develop a web-based system to provide the security enhancement of UNIMAS and provide the safety of every student and staff. Other objectives include:

- To capture and recognize each of the car plates of the vehicle and face of driver or passenger entering the area of the campus by using the camera.
- To create a timeline of the visitor who entering UNIMAS.
- To detect illegal use of UNIMAS official vehicle pass.

1.5 Brief Methodology

The methodology can be described as a method used by the researcher to build a road map and guild the researcher to conduct research or develop a project. It is very important because as mentioned before, the methodology will guide the developer or researcher to follow every stage of the method to complete the project in the short and limit development time.

For this project, the prototype model is considered as a model of methodology that applies to this project. It is used to allow the users to evaluate system development proposals and try them out before the implementation. It also helps understand the requirements which are user specifics and may not have been considered by the developer during product design (SDLC - Software Prototype Model, n.d.). First, it attempts to develop a prototype that is required to analyse the project. Then, the developer has designed and develop the initial prototype. After the initial prototype is done, the developer needs the evaluation and comments

from the customers to complete the unfinished product as per the requirement of the suitable prototype. At last, the complete system is done and delivered to the customers. Several phases will be brief for the roadmap of the development of the entire project.

In the first phase, the requirement analysis phase is described as the identity of the basic requirement of the proposed system. It is needed to do the literature review to analyse similar products and do a comparison with each other. This will be explained in Chapter 2 and part of Chapter 3. It is used to find out the pros and cons of each system to determine the requirement for system development.

Next, the second phase is the design phase. During the design phase, the developer needs to design the architecture of the proposed system. The developer will do the logical design and physical design of the proposed system that will be explained in Chapter 3. This is appropriated to the developer to design the main function of the system and ensure the system can run without any problem theoretically.

In the third phase, which is developing the initial prototype phase. At this phase, the developer builds an initial prototype that consists of the basic requirement and functions to run. This will be explained in Chapter 4. The initial prototype may not be accurate to work regarding the requirement perfectly.

The next phase in the prototyping model is a review of the prototype phase. After the stakeholders review the updated product, the feedback they are given will collect and used for further system enhancements. Developers must ensure the prototype meets the design goals and it can perform every feature. This will be explained in Chapter 4.

In the fifth phase, the iteration and enhancement of the prototype are vital to the project. The prototype would need to enhance if the initial prototype has not met the expectation during the review of the prototype. This will be explained in Chapter 5.

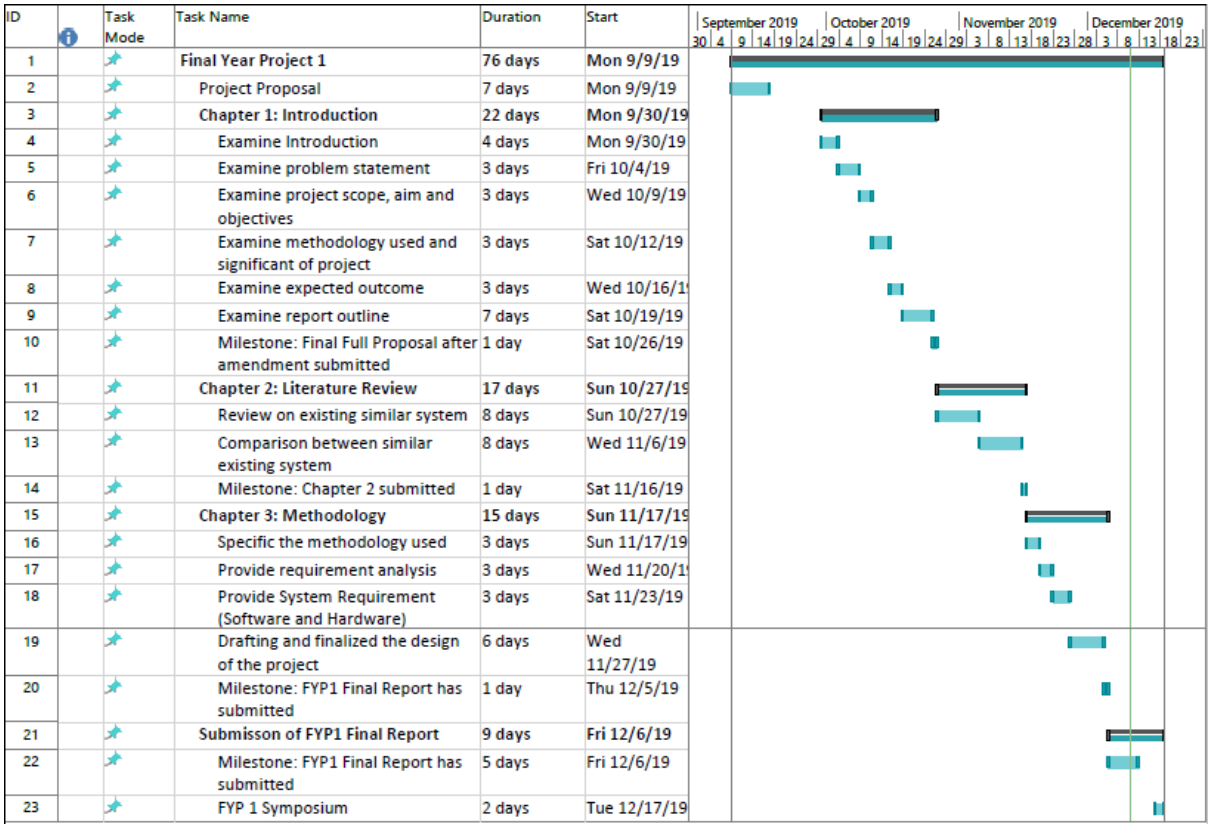
1.6 Significance of Project

The Visitor timeline tracking System helps to reduce the workload of security guards and reduce the complexity of the manual-based secure workflow. A centralized platform will help the security guards to transfer the information between the Safety Unit and guardhouses. All of the data and information is real-time sharing and it can help the Safety Unit can provide support if necessary. This makes the visitor timeline tracking system more efficient.

Moreover, every student or visitor who is not left from the area of campus will be recorded into the blacklist and be checked by the security guards. The system will remind the guards that if somebody or some cars which are recorded in the blacklist, the guards will use the manual operation to them. It is also operated to the drivers who illegally use of official vehicle car plate.

1.7 Project Schedule

The project schedule is used as guidance that reminds the development progression of the proposed system to the developer. It is also used to ensure the project will complete within the time frame. Gantt chart is created by the Microsoft Project 2019 that used to display the schedule and consists of the project activities, milestones, start and finish dates. The project schedule for developing the proposed system is shown as the figure below:



ID	Task Mode	Task Name	Duration	Start
1		**Final Year Project 1**	**76 days**	**Mon 9/9/19**
2		Project Proposal	7 days	Mon 9/9/19
3		**Chapter 1: Introduction**	**22 days**	**Mon 9/30/19**
4		Examine Introduction	4 days	Mon 9/30/19
5		Examine problem statement	3 days	Fri 10/4/19
6		Examine project scope, aim and objectives	3 days	Wed 10/9/19
7		Examine methodology used and significant of project	3 days	Sat 10/12/19
8		Examine expected outcome	3 days	Wed 10/16/1
9		Examine report outline	7 days	Sat 10/19/19
10		Milestone: Final Full Proposal after amendment submitted	1 day	Sat 10/26/19
11		**Chapter 2: Literature Review**	**17 days**	**Sun 10/27/19**
12		Review on existing similar system	8 days	Sun 10/27/19
13		Comparison between similar existing system	8 days	Wed 11/6/19
14		Milestone: Chapter 2 submitted	1 day	Sat 11/16/19
15		**Chapter 3: Methodology**	**15 days**	**Sun 11/17/19**
16		Specific the methodology used	3 days	Sun 11/17/19
17		Provide requirement analysis	3 days	Wed 11/20/1
18		Provide System Requirement (Software and Hardware)	3 days	Sat 11/23/19
19		Drafting and finalized the design of the project	6 days	Wed 11/27/19
20		Milestone: FYP1 Final Report has submitted	1 day	Thu 12/5/19
21		**Submisson of FYP1 Final Report**	**9 days**	**Fri 12/6/19**
22		Milestone: FYP1 Final Report has submitted	5 days	Fri 12/6/19
23		FYP 1 Symposium	2 days	Tue 12/17/19

Figure 1.1. Displayed the timeline of Project Schedule

1.8 Expected Outcome

The expected outcome of this project is to provide a centralized platform for the security guards for more efficient tracking and monitoring of each of the cars and people entering the area of campus. Every car and driver will be recognized by the image processing via both cameras will make the work easy for security guards and ensure the good status of the security situation. Besides, the database will record the details of each car and people entering or leaving the area of campus that include the car plate of the car, face image of driver and passenger, time and date. The guards will be able to view the basic details of the vehicles and people by using the database.

1.9 Project Report Outline

Chapter 2: Literature Review

Chapter 2 describes the review done on the existing systems or systems that are similar to the purposed project, which is referred from the official website and research journal. The limitation of the existing system will be identified and discuss which of the improvement can apply to the purposed system. Besides, background study is also made a comparison between existing systems and purposed system.

Chapter 3: Requirement Analysis and Design

Chapter 3 discusses the methodology that chooses to be a guild line for the development of the purposed system. It is used to present the design of the proposed system and justify the way to fulfil the requirements. It is also included Data Flow Diagram (DFD), Entity Relationship Diagram (ERD)and Data Dictionary to express the design of the system.

Chapter 4: Implementation and Testing

Chapter 4 focuses on the implementation and testing of the purposed system. The prototype of the system has been done and the design layout will be shown.

Chapter 5: Conclusion

Chapter 5 presents the conclusion of the entire project and discuss the outlines of the future work of the purposed project.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is used to study and review done on the existing systems that are similar to the purposed project, which is referred from the official websites and journals. This chapter also discusses the tool and technology that will be used for the development of the purposed system.

2.2 Current Scenario Analysis

The traditional visitor management system at UNIMAS still needs to be biased toward guards to handle visitors entering and leaving the campus manually. The people who have their official vehicle pass are registered in the online system of the Safety Unit. The official vehicle pass is classified into two identities, which are lecturer/staff and student. And they can be directly driven into the campus by the identification of the guards. Visitors and some students who didn't have an official vehicle pass are required to obtain the pass at the guardhouse after submitting their IC or driving license. When leaving the campus, visitors need to return the pass and get back the IC or driving license. Besides, this system does not run a schedule to record the time of entering and leaving visitors.

Although it is efficient to secure the campus, it is also not ideal in the convenience part. So, it has the potential that can upgrade the existing system and cooperate with the current technology to provide a high-level secure environment.

2.3 Review of Similar Existing System

There are four existing systems are chosen to discuss and do the comparison between each other, which are Easy Visitor Management System, Ingress Visitor Management Visitor, Face Recognition Visitor Management System and Vehicle Tracking using Number Plate Recognition System. There are some features at each of the systems that will be discussed and implemented in the purposed project.

2.3.1 Easy Visitor Management System (Easy VMS)

The Easy Visitor Management System is a software designed and developed to enhance the security of the living surrounding by tracking the visitors. It is ensured the proper management of visitors to the premises like condominiums, factories, offices, campuses and other facilities where the visitors have come and go frequently (Easy Management System, n.d.). It is used the MyKad reader (Identity Card Reader) to scan and read the details of visitors to register the visitors for tracking and all of these are done by manual operation or using computer form (Figure 2.1). The details and photos of visitors are stored in the system along with the entering and leaving time (Figure 2.2).

Moreover, it is also can record other information about the visit like the person to meet, location and other problems with the visitors. The system can blacklist the visitors and give them warnings to visit those secure areas. The system can generate Barcode passes for individuals or cars (Figure 2.3). And the visitors use the passes to check-in and out with a barcode reader. It also can issue permanent passes for frequent visitors.